



New records of Ephemeroptera (Insecta) from Tocantins state, northern Brazil

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Abstract: New records and notes on the distribution of the Ephemeroptera are presented. The genera *Campylocia*, *Amanahyphes*, *Traverhyphes*, *Simothraulopsis*, *Tikuna*, and *Ulmeritoides* are reported from Serra do Lajeado Environmental Protection Area, Tocantins state. With the results of the present study, the number of species known for Tocantins state has increased from two to seven.

Key words: Mayfly; Neotropics; Brazilian Savannah; checklist

INTRODUCTION

The order Ephemeroptera (Insecta) is considered an oligodiverse group, represented by about 3300 species distributed in 42 families (BARBER-JAMES et al. 2013). A recent checklist of Brazilian Ephemeroptera (mayflies) recorded 344 species from this country (SALLES et al. 2016).

The ephemeropteran fauna is considered poorly known (less than four species recorded) for six of the 27 Brazilian states (Acre, Alagoas, Paraíba, Rio Grande do Norte, Sergipe, and Tocantins) as well as the Federal District (SALLES et al. 2016). Only one genus, *Camelobaetidius* Demoulin, 1966 and two species, *C. billi* Thomas & Dominique, 2001 and *C. francischettii* Salles, Andrade & Da-Silva, 2005, has been recorded for Tocantins so far.

This study presents new records and distributional notes for mayflies from Tocantins, northern Brazil, based on collections from the Serra do Lajeado Environmental Protection Area.

MATERIALS AND METHODS

We collected ephemeropteran specimens from a riffle in a gallery forest (10° 13' 50.93" S, 048° 07' 19.40" W), from 21–25 March 2016, at the Evilson waterfall, district of Taquaruçu, in the Serra do Lajeado Environmental Protection Area (APA), Palmas, Tocantins state, Brazil (Figure 1). The distribution map was prepared using the software DIVA-GIS, version 7.5.

The subimagos were captured with light traps from 18:00–21:00 h, and nymphs were captured with an aquatic entomological net. Male genital structures were examined in alcohol gel and then stored in alcohol. Permanent slides of nymph mouthparts, legs, and gills were prepared using Euparal® as the mounting medium.

Our identifications were based on keys by DOMÍNGUEZ et al. (2006) and comparison to original descriptions. Diagnoses of each species are based on DOMÍNGUEZ et al. (2006), BOLDRINI et al. (2009), and MOLINERI et al. (2015). Abbreviations of wing veins are from DOMÍNGUEZ et al. (2006): Cubital intercalary vein (ICu); anterior medius vein (MA); posterior medius vein (MP); subcostal vein (Sc).

The material examined is deposited in the Universidade Federal de Roraima Zoological Collection (UFRR), Boa Vista, RR, Brazil, and in the Universidade Federal do Tocantins Entomological Collection (CEUFT), Porto Nacional, Tocantins, Brazil.

RESULTS

The new records of mayfly species from Tocantins are proved below. For each species we list geographical distribution data and provide a diagnosis.

Species list

Family Euthyplociidae

Campylocia demoulini Gonçalves & Salles, 2017 (Figures 2, 3)

Campylocia demoulini GONÇALVES et al. (2017): 11.

Diagnosis. Male Imago: 1) penis lobes diverge along median line (Figure 3); 2) subgenital plate with posterior border convex to almost truncate; 3) one ICu vein in forewing.

Previous distribution. Brazil: state of Amazonas (GONÇALVES et al. 2017). French Guiana, and Suriname.

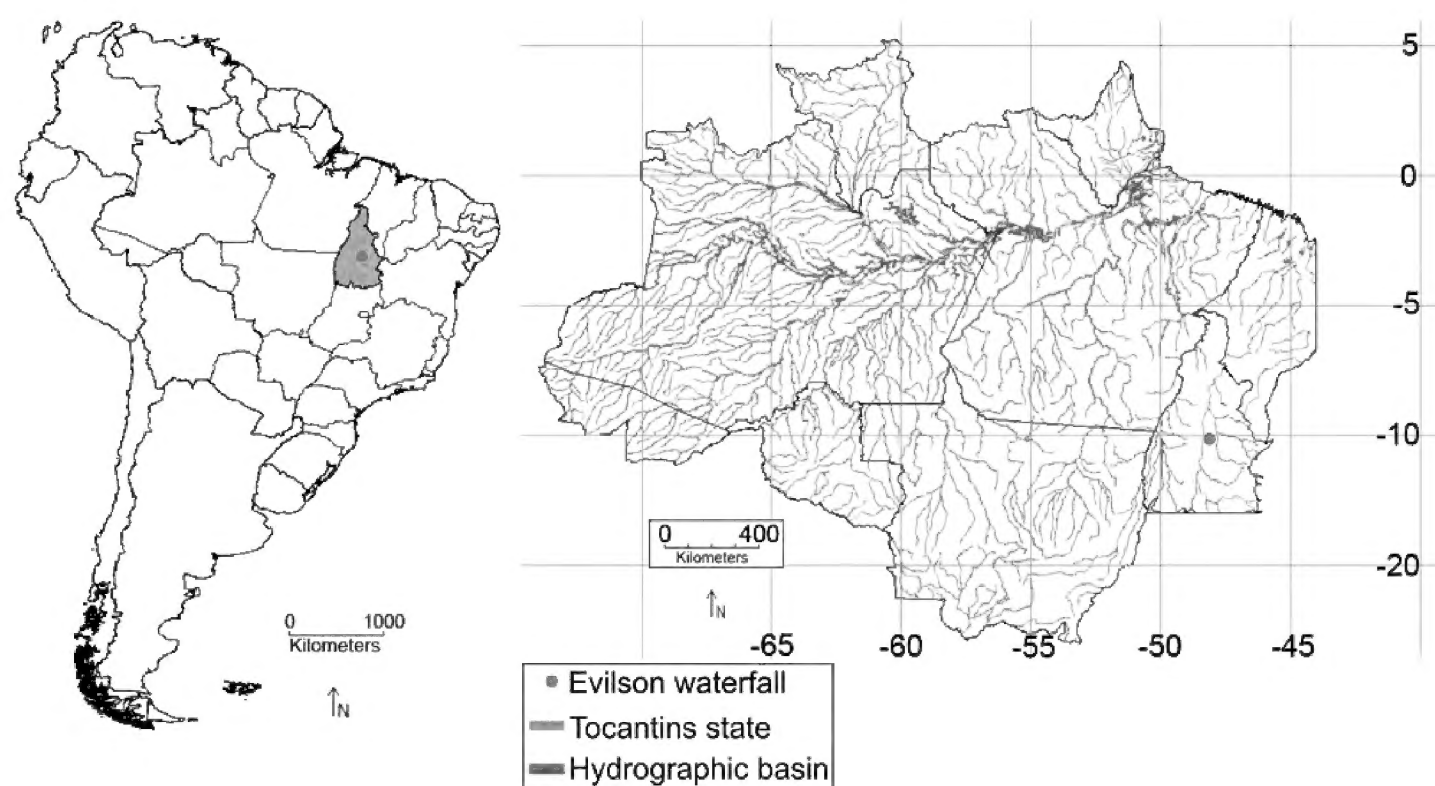


Figure 1. Map on the left shows the Brazilian states, highlighting the Tocantins state (gray) and the Palmas municipality (yellow-red point). The right map shows the hydrographic basin of the Brazilian Amazon (green) and the collections location (Evilson waterfall, yellow-red point).



Figures 2, 3. *Campylocia demoulini*. **2.** Male imago, lateral view. **3.** Genitalia (ventral view).

Examined material. One male imago (UFRR 131), Brazil, Tocantins state, Palmas, district of Taquaruçu, Evilson waterfall, 21–25.III.2016, T.K. Krolow col.

Family Leptohyphidae

Amanahyphes bahiensis Molineri, Lima, Knapp & Docio, 2015 (Figure 4)

Amanahyphes bahiensis MOLINERI et al. (2015): 289.

Diagnosis. Male imago: 1) femoral spines long, slender and acuminate; tarsal claws with 10–11 marginal denticles and 2+3 subapical submarginal denticles; 2) gill formula (number of lamellae per gill) 3/2/2/2.



Figure 4. Nymph of *Amanahyphes bahiensis* (dorsal view).



Figures 5, 6. *Simothraulopsis demerara*. **5.** Male imago (dorsal view). **6.** Male genitalia (ventral view).

Previous distribution. Brazil: state of Bahia (MOLINERI et al. 2015).

Examined material. One nymph (UFRR 132), Brazil, Tocantins state, Palmas, district of Taquaruçu, Evilson waterfall, 21–25.III.2016, T.K. Krolow col.

Traverhyphes sp.

Examined material. One male subimago (UFRR 133), Brazil, Tocantins state, Palmas, district of Taquaruçu, Evilson waterfall, 21–25.III.2016, T.K. Krolow col.

Family Leptophlebiidae

Simothraulopsis demerara (Traver, 1947) (Figures 5, 6)

Thraululus demerara TRAVER (1947): 150.

Simothraulopsis surinamensis DEMOULIN (1966): 15; DOMÍNGUEZ et al. (1997): 146.

Simothraulopsis demerara; DOMÍNGUEZ et al. (1997): 146; DOMÍNGUEZ et al. (2006): 486; KLUGE (2007): 388; SALLES et al. (2010): 300; LIMA et al. (2012): 311; LIMA et al. (2015): 5; LIMA et al. (2016): 217.

Diagnosis. Male imago: 1) Fork of MA of forewings asymmetrical, stem of MA straight; 2) costal projection of hind wings strongly developed, located about 2/3 distance from wing base to apex; 3) hind wing vein Sc ending at base of costal projection; 4) hind wing vein MP unforked; 5) tarsal claws of a pair dissimilar, one apically hooked and the other obtuse, pad-like; 6) penes divided in apical half with one ventrally directed spine on each lobe (Figure 6).

Previous distribution. Brazil: states of Pará, Amazonas (DOMÍNGUEZ et al. 1997); Bahia (LIMA et al. 2016); Espírito Santo (SALLES et al. 2010); Pernambuco (LIMA et al. 2012). Colombia, French Guiana, Suriname, and Venezuela.

Examined material. One male (UFRR 134) and one female adults (UFRR 135), Brazil, Tocantins state, Palmas, district of Taquaruçu, Evilson waterfall, 21–25.III.2016, T.K. Krolow col.



Figure 7. Nymph of *Tikuna bilineata* (dorsal view).

Tikuna bilineata (Needham & Murphy, 1924) (Figure 7)

Choroterpes bilineata NEEDHAM & MURPHY (1924): 1924.

Tikuna bilineata; PETERS et al. (2005): 52; DOMÍNGUEZ et al. (2006): 511; BOLDRINI et al. (2009): 7; SALLES et al. (2014): 200; ANGELI et al. (2015): 202.

Diagnosis. Nymph: 1) terga yellow, segments I–VIII with longitudinal submedial black mark; 2) apex of tibia with pectinate setae; 3) apex of galea-lacinia with one large pectinate setae, and one short, non-pectinate curved setae; 4) posterolateral projections present on terga VIII–IX.

Previous distribution. Brazil: states of Pará (PETERS et al. 2005); Amazonas (SALLES et al. 2014); Mato Grosso (BOLDRINI et al. 2009), and Espírito Santo (ANGELI et al. 2015). Ecuador, Suriname, Venezuela, and Colombia.

Examined material. One male nymph (UFRR 136), Brazil, Tocantins state, Palmas, district of Taquaruçu, Evilson waterfall, 21–25.III.2016, T.K. Krolow col.

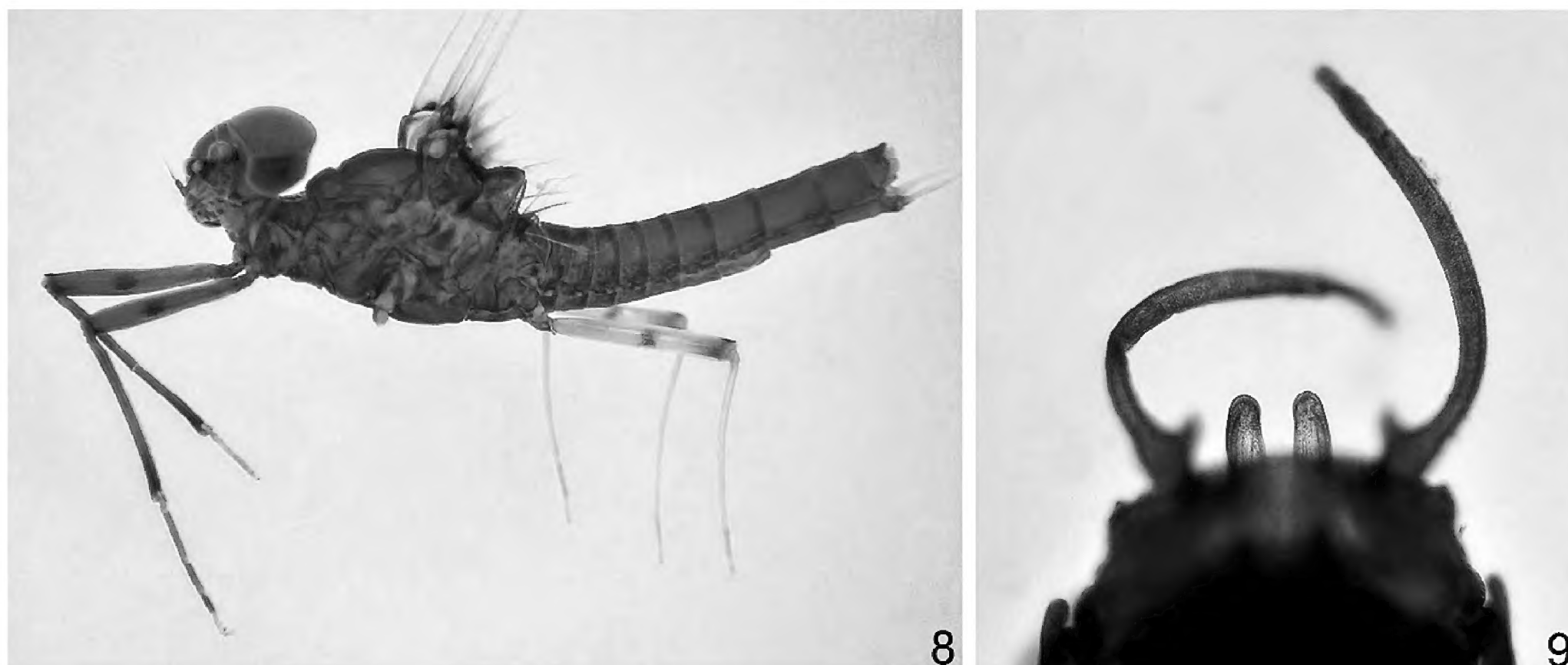
Ulmeritoides flavopedes (Spieth, 1943) (Figures 8, 9)

Thraululus flavopedes SPIETH (1943): 11.

Atalophlebioides flavopedes; TRAVER (1946): 426.

Ulmeritoides oepa LOPES, DA-SILVA & PY-DANIEL (2003): 195; DOMÍNGUEZ et al. (2006): 527; SALLES & DOMÍNGUEZ (2012): 59.

Ulmeritoides flavopedes; DOMÍNGUEZ (1991): 162; DOMÍNGUEZ et al. (2006): 524; SALLES & DOMÍNGUEZ (2012): 59; LIMA et al. (2015): 5; LIMA et al. (2016): 217.



Figures 8, 9. *Ulmeritoides flavopedes*. **8.** Male imago, lateral view. **9.** Genitalia (ventral view).

Diagnosis. Male imago: 1) Membrane of fore wing hyaline, wing bases brown; 2) apex of penis lobes rounded, each with a lateral groove; 3) abdominal terga orange-brown, posterior margins blackish.

Previous distribution. Brazil: states of Roraima (LOPES et al. 2003), Mato Grosso (SHIMANO et al. 2010), Pernambuco (LIMA et al. 2015), and Bahia (LIMA et al. 2016).

Examined material. Two male imago (UFRR 137, UFRR 138), Brazil, Tocantins state, Palmas, district of Taquaruçu, Evilson waterfall, 21–25.III.2016, T.K. Krolow col.

DISCUSSION

Our study records six genera and five species for the first time from the state of Tocantins. It increases the number of genera known to seven, and to seven the number of species known. The subimago of *Traverhyphes* could not be identified to species, and additional specimens are needed.

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